ArevaEPRDCPEm Resource

From: BRYAN Martin (EXT) [Martin.Bryan.ext@areva.com]
Sent: Friday, March 05, 2010 4:31 PM
To: Tesfaye, Getachew
Cc: DELANO Karen V (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); ROMINE Judy (AREVA NP INC); PANNELL George L (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 309, FSAR Ch. 7, Supplement 2
Attachments: RAI 309 Supplement 2 Response US EPR DC.pdf

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information RAI 309 Supplement 2. The attached file, "RAI 309 Response US EPR DC.pdf,"provides technically correct and complete response to the 2 remaining questions. This completes the responses to RAI 309.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 309 Question 07.09-59.

The following table indicates the respective pages in the response document, "RAI 309 Supplement 2 "Response US EPR DC.pdf," that contains AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 309 — 07.09-59	2	3
RAI 309 — 07.09-60	4	4

Sincerely,

Martin (Marty) C. Bryan
Licensing Advisory Engineer
AREVA NP Inc.
Tel: (434) 832-3016
Martin.Bryan.ext@areva.com

From: DUNCAN Leslie E (AREVA NP INC)
Sent: Friday, January 29, 2010 5:38 PM
To: 'Tesfaye, Getachew'
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); PANNELL George L (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 309, FSAR Ch. 7, Supplement 1

Getachew,

AREVA NP is unable to provide a response to RAI 309, Questions 07.09-59 and 07.07-60 at this time. The commitment date for these questions has been changed to March 5, 2010 to allow time to incorporate comments and feedback from the recent 1/25/10-1/26/10 meeting with the NRC related to U.S. EPR FSAR Chapter 7.

The schedule for technically correct and complete responses has been revised and is provided below:

Question #	Response Date
RAI 309 — 07.09-59	March 5, 2010
RAI 309 — 07.07-60	March 5, 2010

Sincerely,

Les Duncan
Licensing Engineer
AREVA NP Inc.
An AREVA and Siemens Company
Tel: (434) 832-2849
Leslie.Duncan@areva.com

From: Pederson Ronda M (AREVA NP INC)
Sent: Friday, November 20, 2009 6:59 PM
To: 'Tesfaye, Getachew'
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); PANNELL George L (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 309, FSARCh. 7

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information RAI 309. The attached file, "RAI 309 Response US EPR DC.pdf,"provides a schedule since a technically correct and complete response to the 2 questions is not provided.

The following table indicates the respective page in the response document, "RAI 309 Response US EPR DC.pdf," that contains AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 309 — 07.09-59	2	2
RAI 309 — 07.09-60	3	3

A complete answer is not provided for the 2 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Response Date
RAI 309 — 07.09-59	January 29, 2010
RAI 309 — 07.07-60	January 29, 2010

Sincerely,

Ronda Pederson

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Licensing Manager, U.S. EPR Design Certification
AREVA NP Inc.
An AREVA and Siemens company
3315 Old Forest Road
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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Wednesday, October 21, 2009 6:14 PM
To: ZZ-DL-A-USEPR-DL
Cc: Zhang, Deanna; Spaulding, Deirdre; Jackson, Terry; Canova, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 309 (3835), FSARCh. 7

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on October 9, 2009, and on October 21, 2009, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,
Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 1215

Mail Envelope Properties (BC417D9255991046A37DD56CF597DB710578724C)

Subject: Response to U.S. EPR Design Certification Application RAI No. 309, FSAR Ch. 7, Supplement 2
Sent Date: 3/5/2010 4:31:08 PM
Received Date: 3/5/2010 4:31:11 PM
From: BRYAN Martin (EXT)

Created By: Martin.Bryan.ext@areva.com

Recipients:
"DELANO Karen V (AREVA NP INC)" <Karen.Delano@areva.com>
Tracking Status: None
"BENNETT Kathy A (OFR) (AREVA NP INC)" <Kathy.Bennett@areva.com>
Tracking Status: None
"ROMINE Judy (AREVA NP INC)" <Judy.Romine@areva.com>
Tracking Status: None
"PANNELL George L (AREVA NP INC)" <George.Pannell@areva.com>
Tracking Status: None
"Tesfaye, Getachew" <Getachew.Tesfaye@nrc.gov>
Tracking Status: None

Post Office: AUSLYNCMX02.adom.ad.corp

Files	**Size**	**Date & Time**
MESSAGE	4643	3/5/2010 4:31:11 PM
RAI 309 Supplement 2 Response US EPR DC.pdf	49758	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Response to

Request for Additional Information No. 309, Supplement 2

10/21/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 07.09 - Data Communication Systems
Application Section: Section 7.1

QUESTIONS for Instrumentation, Controls and Electrical Engineering 1 (AP1000/EPR Projects) (ICE1)

Question 07.09-59:

Demonstrate how the Remote Acquisiton Unit (RAU) ring network satisfies 10 CFR 50, Appendix A, General Design Criterion (GDC) 21, "Protection System Reliability and Testability," and IEEE Std. 603-1991, Clause 5.1, "Single-Failure Criterion." Specifically, within a division, given one RAU is out of service, and the other redundant RAU or Self Powered Neutron Detectors (SPNDs) suffer undetected single-failures such that the sufficient number of SPND measurements are not available to support the linear rate or departure from nucleate boiling (DNB) trips, demonstrate how the protection system has acceptable reliablity.

GDC 21 states: "the protection system shall be designed for high functional reliability and inservice testability commensurate with the safety functions to be performed. Redundancy and independence designed into the protection system shall be sufficient to assure that (1) no single failure results in loss of the protection function and (2) removal from service of any component or channel does not result in loss of the required minimum redundancy unless the acceptable reliability of operation of the protection system can be otherwise demonstrated. The protection system shall be designed to permit periodic testing of its functioning when the reactor is in operation, including a capability to test channels independently to determine failures and losses of redundancy that may have occurred." In addition, 10 CFR 50.55a(h) incorporates by reference IEEE Std. 603-1991. IEEE Std. 603-1991, Clause 5.1, "Single-Failure Criterion" requires the safety system to perform all safety functions required for a design basis event in the presence of any single detectable failure within the safety systems concurrent with all identifiable but non-detectable failures.

The staff reviewed the "Protection System Failure Modes and Effects Analysis for U.S. EPR DCD," Revision 3, during the U.S. EPR PACS module regulatory audit. The Protection System Failure Modes and Effects Analysis (FEMA) stated that for postulated undetectable blocking failures within a RAU when the redundant RAU is out of service for maintenance or testing, Technical Specifications define the limiting condition for operation. The staff finds that the applicant has not provided sufficient information to demonstrate how loss of the required minimum redundancy does not impact the reliability of the protection system given the postulated identified undetected block failures. Provide information to demonstrate that the reliability of operation of the protection system is acceptable given the loss of the required minimum redundancy as stipulated by GDC 21. Specifically, within a division, given one RAU is out of service, and the other redundant RAU or Self Powered Neutron Detectors (SPNDs) suffer undetected single-failures such that the sufficient number of SPND measurements are not available to support the linear rate or departure from nucleate boiling (DNB) trips, demonstrate how the protection system has acceptable reliablity.

Response to Question 07.09-59:

GDC 21 states in part:

> "The protection system shall be designed for high functional reliability and inservice testability commensurate with the safety functions to be performed. Redundancy and independence designed into the protection system shall be sufficient to assure that (1) no single failure results in loss of the protection function and (2) removal from service of any component or channel does not result in loss of the required minimum redundancy unless the acceptable reliability of operation of the protection system can be otherwise demonstrated."

IEEE Std. 603-1998, Clause 6.7, “Maintenance Bypass” states in part:

> “Note – For portions of the sense and command features that cannot meet the requirements of 5.1 and 6.3 when in maintenance bypass, acceptable reliability of equipment operation shall be demonstrated (e.g., that the period allowed for removal from service for maintenance bypass is sufficiently short, or additional measures are taken, or both, to ensure there is no significant detrimental effect on overall sense and command feature availability).”

In the case of one RAU in maintenance, the U.S. EPR protection system (PS) is able to perform its functions utilizing the redundant RAU in the same division. However, in this scenario, the minimum redundancy to satisfy the single failure criterion is not present.

Consistent with both GDC 21 and IEEE-603 Clause 6.7, the acceptable reliability of the PS is demonstrated by a stringent constraint on the amount of time an RAU can be removed from service for maintenance bypass. The Technical Specifications governing the PS are found in U.S. EPR FSAR Tier 2, Chapter 16, LCO 3.3.1. Condition H dictates that if an RAU is out of service for longer than 6 hours, the plant must transition to a state where the RAUs are not required. This provides reasonable assurance that there is no significant detrimental effect on overall availability of the PS. U.S. EPR FSAR Tier 2, Section 7.1.2.6.34 will be revised to clarify this point.

It should be noted that the technical specification intervals for RAU surveillances are 24 months. Therefore, planned surveillance testing of RAUs will normally occur during refueling outages so that they are not removed from service during power operation unless a failure occurs.

FSAR Impact:

U.S. EPR FSAR, Tier 2, Section 7.1.2.6.34 will be revised as described in the response and indicated on the enclosed markup.

Question 07.09-60:

Demonstrate how the various data networks in the main control room (MCR), in the event of a control room fire, would not affect the capability to achieve safe shutdown, given that the plant data network, the terminal data network, and other components are shared between the MCR workstations and the Remote Shutdown Station (RSS) workstations.

10 CFR 50, Appendix R, III.G, "Fire Protection of Safe Shutdown Capability," requires, in part, fire protection features be provided for structures, systems, and components important to safe shutdown. Tier 2, Section 9.5.1.1 of the U.S. EPR Final Safety Analysis Report (FSAR) states that because of the MCR physical configuration, for a fire in the MCR, an independent alternative shutdown capability (RSS) that is physically and electrically independent of the MCR is used to achieve safe shutdown conditions. Tier 2, Section 7.1.1.3.1 and Section 7.1.1.3.2 of the U.S. EPR FSAR describe the capabilities of the SICS and PICS to achieve both hot and cold shutdown conditions from the RSS in case of a fire in the MCR. However, Tier 2, Figure 7.1-5 “Process Information and Control System Architecture” depicts the terminal data network being shared by both the MCR operator workstations and the RSS operator workstations. Inaddition, the terminal data network is connected to the plant data network through Process Units (PUs). Demonstrate that in the event of a fire in the MCR, the terminal data network, and the plant data network will not be impacted such that the RSS workstations maintain the capability for hot and cold shutdown to meet the requirements of 10 CFR 50, Appendix R, III.G.

Response to Question 07.09-60:

U.S. EPR FSAR, Tier 2, Figure 7.1-5 is a functional representation of the PICS, and not intended to address physical location of the various network components.

The PUs and plant data network are physically located in a separate fire area from the MCR, and are therefore unaffected by fire in the MCR.

The terminal data network hardware is located so that damage from a fire event in the MCR will be limited to network components required for the operation of MCR workstations and have no impact on the overall functionality of the terminal data network. Portions of the network required for operation from the RSS are located in a separate fire area from the MCR, so damage from a fire event in the MCR will be limited to the workstations in the MCR and will not impact the ability to safely shutdown the plant from the PICS workstations in the RSS.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

U.S. EPR Final Safety Analysis Report Markups

Operational availability during an accident may be verified using one of the above methods, or by specifying the time period it retains its calibration.

7.1.2.6.33 Operating Bypass (Clauses 6.6 and 7.4)

The safety systems meet the requirements of Clause 6.6 and 7.4 of IEEE Std 603-1998 (Reference 1).

Operating bypasses are implemented using permissive signals from the PS. If the plant conditions associated with allowing operational bypasses are not met, the PS automatically prevents the activation of the operating bypass.

When an operating bypass is in effect, indication of this condition is provided to the MCR. If plant conditions change during activation of an operating bypass, and the operating bypass is no longer permissible, in general the PS automatically removes the appropriate active operating bypass.

Low temperature overpressure protection (LTOP) of the RCS is normally bypassed using P17 when at power. During shutdown operations, LTOP protection is enabled when P17 is manually validated by the operator once the conditions for P17 are satisfied. This is a controlled evolution governed by plant operating procedures. This is consistent with the guidance provided in BTP 5-2 (Reference 38), industry precedent, and meets the intent of Clause 6.6 of IEEE Std 603-1998 (Reference 1). Refer to Section 5.2 for more information about LTOP.

Refer to Section 7.2 and Section 7.3 for further information on permissives and the operating bypasses of the protective functions.

7.1.2.6.34 Maintenance Bypass (Clauses 6.7 and 7.5)

The safety systems meet the requirements of Clause 6.7 of IEEE Std 603-1998 (Reference 1).

The safety systems are designed to permit channel bypass for maintenance, testing, or repair. Individual function computers of the SICS, PS, and SAS can be placed into testing and diagnostic modes via the SU. The function computer being tested automatically changes its outputs to the associated I/O modules to test status, and communication from the unit under test is disregarded by the remainder of the system. This bypass is accomplished during power operation without causing initiation of a protective function. During maintenance bypass, the single failure criterion is still met, or acceptable reliability is demonstrated. ~~and single failure criterion is still met as the protection functions associated with the function computer in test status are duplicated in other redundant computers within the PS and SAS.~~

07.09-59